

WHAT IS CLAIMED IS:

1. An image processing apparatus for, when a frame rate, which can assure sufficiently high image quality of a moving image, is expressed by N frames/sec,

5 playing back moving image data, which has a frame rate of M ( $M > N$ ) frames/sec higher than that frame rate, and respective frames of which are compression-encoded to be independently decodable, comprising:

decoding means for decoding the  
10 compression-encoded frames;

switching means for switching a playback mode between a normal playback mode and slow playback mode;

first playback means for, when said switching means selects the normal playback mode, reading out  
15 frames from the image data at a first frame interval, decoding the readout frames by said decoding means, and playing back the decoded frames at substantially N frames/sec; and

second playback means for, when said switching means selects the slow playback mode, reading out  
20 frames from the image data at a second frame interval narrower than the first frame interval, decoding the readout frames by said decoding means, and playing back the decoded frames at least at substantially N  
25 frames/sec.

2. The apparatus according to claim 1, wherein the compressed moving image data has a structure which

includes both a frame group captured at M frames/sec,  
and a frame group captured at N frames/sec, and

said second playback means is applied to the  
frame group captured at M frames/sec.

- 5 3. The apparatus according to claim 1, wherein the  
compressed moving image data has a structure which  
includes both a frame group captured at M frames/sec,  
and a frame group captured at N frames/sec, and

said apparatus further comprises third playback  
10 means for playing back the frame group captured at N  
frames/sec at a normal frame rate, and playing back the  
frame group captured at M frames/sec in the slow  
playback mode at the normal frame rate without  
decimation upon playing back the moving image data.

- 15 4. The apparatus according to claim 3, wherein said  
second playback means includes a manual mode that  
executes slow playback upon reception of a slow  
playback instruction, and an auto mode that executes a  
slow playback process irrespective of the  
20 presence/absence of a slow playback instruction.

5. The apparatus according to claim 1, wherein the  
respective frames of the moving image data are encoded  
by JPEG2000 encoding.

6. The apparatus according to claim 1, wherein the  
25 moving image data is encoded by MotionJPEG encoding.

7. An image processing method of playing back, when  
a frame rate, which can assure sufficiently high image

quality of a moving image, is expressed by N frames/sec, moving image data, which has a frame rate of M ( $M > N$ ) frames/sec higher than that frame rate, and respective frames of which are compression-encoded to be independently decodable, comprising:

5       a decoding step of decoding the compression-encoded frames;

10       a first playback step of reading out, when switching means for switching a playback mode between a normal playback mode and slow playback mode selects the normal playback mode, frames from the image data at a first frame interval, decoding the readout frames in the decoding step, and playing back the decoded frames at substantially N frames/sec; and

15       a second playback step of reading out, when the switching means selects the slow playback mode, frames from the image data at a second frame interval narrower than the first frame interval, decoding the readout frames in the decoding step, and playing back the

20       decoded frames at least at substantially N frames/sec.

8.     A computer program serving as an image processing apparatus for, when a frame rate, which can assure sufficiently high image quality of a moving image, is expressed by N frames/sec, playing back moving image

25       data, which has a frame rate of M ( $M > N$ ) frames/sec higher than that frame rate, and respective frames of which are compression-encoded to be independently

decodable, said program serving as:

decoding means for decoding the  
compression-encoded frames;

first playback means for, when switching means  
5 for switching a playback mode between a normal playback  
mode and slow playback mode selects the normal playback  
mode, reading out frames from the image data at a first  
frame interval, decoding the readout frames by said  
decoding means, and playing back the decoded frames at  
10 substantially N frames/sec; and

second playback means for, when said switching  
means selects the slow playback mode, reading out  
frames from the image data at a second frame interval  
narrower than the first frame interval, decoding the  
15 readout frames by said decoding means, and playing back  
the decoded frames at least at substantially N  
frames/sec.

9. A computer readable storage medium storing a  
computer program of claim 8.

20 10. An image processing apparatus for playing back  
moving image data, respective frames of which are  
hierarchically compression-encoded to be independently  
decodable, comprising:

decoding means for decoding the  
25 compression-encoded frames;

switching means for switching a playback mode  
between a normal playback mode and slow playback mode;

first playback means for, when said switching means selects the normal playback mode, reading out data within a first range from low to high hierarchical components of respective frames from the moving image data, decoding the readout frames by said decoding means, and playing back the decoded frames; and

second playback means for, when said switching means selects the slow playback mode, reading out data within a second range, broader than the first range, from low to high hierarchical components of respective frames from the moving image data, decoding the readout frames by said decoding means, and playing back the decoded frames.

11. The apparatus according to claim 10, wherein the compression-encoded moving image data is a data stream which includes both a high-definition frame group, and a low-definition frame group, and said second playback means is applied to only the high-definition frame group.

12. The apparatus according to claim 10, wherein the compression-encoded moving image data is a data stream which includes both a high-definition frame group, and a low-definition frame group, and

said apparatus further comprises control means for, when the high-definition frame group is played back, controlling to play back using said second playback means.

13. The apparatus according to claim 10, wherein said second playback means includes a manual mode that executes slow playback upon reception of a slow playback instruction, and an auto mode that executes a slow playback process irrespective of the presence/absence of a slow playback instruction.

14. The apparatus according to claim 10, wherein the respective frames of the moving image data are encoded by JPEG2000 encoding.

15. The apparatus according to claim 10, wherein the moving image data is encoded by MotionJPEG encoding.

16. The apparatus according to claim 10, wherein a high-definition frame group in the moving image data is moving image data which, when a frame rate that can assure sufficiently high image quality of a moving image is expressed by N frames/sec, has a frame rate of M ( $M > N$ ) frames/sec higher than that frame rate, and respective frames of which are compression-encoded to be independently decodable,

said first playback means reads out respective frames from the image data at a first frame interval, decodes the readout frames by said decoding means, and plays back the decoded frames at substantially N frames/sec, and

said second playback means reads out respective frames from the image data at a second frame interval narrower than the first frame interval, decodes the

readout frames by said decoding means, and plays back the decoded frames at least at substantially N frames/sec.

17. The apparatus according to claim 16, wherein the  
5 compressed moving image data has a structure which includes both a frame group captured at M frames/sec, and a frame group captured at N frames/sec, and said second playback means is applied to the frame group captured at M frames/sec.

10 18. The apparatus according to claim 16, wherein the compressed moving image data has a structure which includes both a frame group captured at M frames/sec, and a frame group captured at N frames/sec, and  
said apparatus further comprises third playback  
15 means for playing back the frame group captured at N frames/sec at a normal frame rate, and playing back the frame group captured at M frames/sec in the slow playback mode at the normal frame rate without decimation upon playing back the moving image data.

20 19. The apparatus according to claim 16, wherein said second playback means includes a manual mode that executes slow playback upon reception of a slow playback instruction, and an auto mode that executes a slow playback process irrespective of the  
25 presence/absence of a slow playback instruction.

20. An image processing method of playing back moving image data, respective frames of which are

compression-encoded for respective subbands of hierarchical frequency components to be independently decodable, comprising:

5 a decoding step of decoding the compression-encoded frames;

a first playback step of reading out, when switching means for switching a playback mode between a normal playback mode and slow playback mode selects the normal playback mode, data within a first range from  
10 low to high hierarchical components of respective frames from the moving image data, decoding the readout frames in the decoding step, and playing back the decoded frames; and

a second playback step of, when said switching  
15 means selects the slow playback mode, reading out data within a second range, broader than the first range, from low to high hierarchical components of respective frames from the moving image data, decoding the readout frames in the decoding step, and playing back the  
20 decoded frames.

21. A computer program serving as an image processing apparatus for playing back moving image data, respective frames of which are hierarchically compression-encoded to be independently decodable, said  
25 program serving as:

decoding means for decoding the compression-encoded frames;



first playback means for, when switching means  
for switching a playback mode between a normal playback  
mode and slow playback mode selects the normal playback  
mode, reading out data within a first range from low to  
5 high hierarchical components of respective frames from  
the moving image data, decoding the readout frames by  
said decoding means, and playing back the decoded  
frames; and

second playback means for, when said switching  
10 means selects the slow playback mode, reading out data  
within a second range, broader than the first range,  
from low to high hierarchical components of respective  
frames from the moving image data, decoding the readout  
frames by said decoding means, and playing back the  
15 decoded frames.

22. A computer readable storage medium storing a  
computer program of claim 21.